

## **REMARKS**

Responsive to the Official Action mailed January 10, 2005, Applicants provide the following remarks. Reconsideration and allowance of the subject application, as amended, are respectfully requested.

Applicants have amended the specification to correct minor typographical errors. No new matter has been entered.

### **Double Patenting**

The Examiner rejected claims 1 - 13 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 – 32 of US. Patent No. 6,756,769.

Enclosed is a Terminal Disclaimer to obviate the double patenting rejection over U.S. Patent No. 6,756,769. Therefore, no specific discussion of the Double Patenting rejection is believed necessary. Also enclosed is a credit card authorization form authorizing a charge in the amount of \$130 for the Terminal Disclaimer Fee for a large entity.

### **35 U.S.C. §102 Rejection**

Claims 1 – 13 have been rejected under 35 U.S.C. § 102 as being unpatentable over US Pat. No. 6,580,258, referred to herein as “Wilcox.” The Examiner points to Wilcox (FIG. 7) as disclosing “a comparator (315), with a reference charge ( $V_{th2}$ ), a capacitor (Ccon), an output

decision circuit to switch the states of operation of the circuitry ...” Applicants respectfully traverse this rejection.

Claim 1 requires “a comparison circuit configured to compare a first comparison signal representative of a charge on said capacitor with a second comparison signal representative of a reference charge and provide a comparison output signal in response to said comparison.” Claim 1 has been amended to clarify that the “capacitor” is the capacitor of the DC to DC converter “coupled to an output terminal of said DC to DC converter.” For example, FIG. 4 of Applicants’ specification illustrates an exemplary capacitor 406 of the DC to DC converter 402 coupled to an output terminal of the DC to DC converter 402. If the charge on the capacitor 406 is above a reference value, undesirable power conditions may occur at terminals 418 and 419 of the charging circuit 411. See page 13, lines 1 – 9 of Applicants’ specification. Hence, claim 1 requires an “output decision circuit” that provides “an enabling signal to enable said DC to DC converter to be controlled by a control signal” if the charge on the capacitor, e.g., capacitor 406, is less than the reference charge.

Wilcox generally discloses a “high efficiency switching regulator” serving a load. Column 2, line 31. Wilcox indicates that efficiency of a switching regulator decreases at low output current levels. Column 2, lines 10-11. Hence, Wilcox teaches to place the regulator in a “sleep mode” at low output current levels to improve efficiency. Column 6, lines 43-45. In such a sleep mode (with reference to the embodiment of FIG. 2), “MOSFETs 16 and 17 are both simultaneously OFF” and “the output load 14 is supported substantially by output capacitor C<sub>OUT</sub>.” Column 7, lines 4 - 6. Stated another way,

“[t]hus, during light loads, control circuit 70 is adapted to turn both MOSFET 16 and MOSFET 17 OFF when they are not needed to maintain the output voltage substantially at the regulated output voltage level if the output capacitor  $C_{OUT}$  is capable of doing so. When the output voltage falls below the regulated voltage level in such a mode, control circuit 70 is adapted to briefly turn switch 15 ON to recharge the output capacitor  $C_{OUT}$  back to a voltage level in excess of the regulated voltage.” Emphasis added. Column 7, lines 15 - 23.

FIG. 7 of Wilcox is an embodiment having a “variable OFF-time feature” and the “high efficiency control circuit of the present invention to drive a switch including a pair of synchronously-switched MOSFETs in a step-down configuration.” Column 12, lines 6 - 11. During sleep mode, “both MOSFETs 16 and 17 are turned OFF, and the output current load is supported substantially by the output capacitor  $C_{OUT}$ .” Emphasis added. Column 13, lines 14 - 16. FIG. 7 of Wilcox discloses a control capacitor  $C_{CON}$  and comparators 312 and 315 as part of the control circuit 350 for use with the variable OFF-time feature of the switching regulator 300. Wilcox indicates “[t]he OFF time,  $t_{OFF}$ , is in turn determined by the time it takes control capacitor  $C_{CON}$  to discharge from its initial voltage to  $V_{TH1}$ , coupled to the non-inverting input of comparator 312. When the control capacitor  $C_{CON}$  discharges to voltage  $V_{TH1}$ , the output of comparator 312 goes LOW, thus setting RS flip-flop 310 and initiating the next ON cycle.” Column 12, lines 37-43.

Therefore, the control capacitor  $C_{CON}$  of Wilcox is not a capacitor of a “DC to DC converter coupled to an output terminal of said DC to DC converter” as required by claim 1.

Any such capacitor of Wilcox would be the output capacitor  $C_{OUT}$  as detailed in the output circuit 30 (FIGs. 2 and 7 of Wilcox). Wilcox does not also disclose, teach, suggest “a comparison circuit configured to compare a first comparison signal representative of a charge on

said capacitor with a second comparison signal representative of a reference charge and provide a comparison output signal in response to said comparison” as required by claim 1. Rather, the comparators 312 and 315 of FIG. 7 of Wilcox compare a charge on the control capacitor  $C_{CON}$  with different voltage threshold levels. Accordingly, Applicants respectfully submit claim 1 is allowable and the Examiner’s rejection of claim 1 under 35 USC §102 should be withdrawn.

Claims 2 – 6 depend directly or indirectly from claim 1 and are allowable for similar reasons above adduced relative to claim 1 in addition to their own further limitations.

Claim 4, for instance, further requires “a discharge path responsive to said second switching signal to discharge said capacitor if said second switching signal is in said first state.” For example, FIG. 4 of Applicants’ specification illustrates a discharge path 436 that discharges the capacitor 406 if the charge on the capacitor is greater than said reference charge.

Wilcox does not disclose, teach, or suggest any discharging of its output capacitor  $C_{OUT}$  capacitor. In fact, Wilcox actually teaches away from having any “discharge path” to discharge a charge on the  $C_{OUT}$  capacitor. This is because Wilcox teaches to go into a sleep mode (open MOSFETs 16 and 17) during low output current conditions if the charge on the output capacitor  $C_{OUT}$  is high enough to support the load during such low output current conditions to achieve a more efficient regulator, and then to recharge the output capacitor  $C_{OUT}$  as necessary once the charge level decreases. In other words, the control circuit (35 of FIG. 2 or 350 of FIG. 7) taught by Wilcox is designed to charge the output capacitor  $C_{OUT}$ , not discharge the output capacitor  $C_{OUT}$ . In fact, any discharging of the output capacitor  $C_{OUT}$  by the control circuit 35, 350 would

frustrate the intended purpose of Wilcox's control circuit by reducing the amount of time the output capacitor  $C_{OUT}$  could serve load during low output current conditions.

Claim 7 is directed to a "battery charging system" comprising a "DC to DC converter having a capacitor coupled to an output terminal of said DC to DC converter." Claim 7 further requires an enabling circuit "for enabling said DC to DC converter to be controlled by a control signal, said enabling circuit comprising: a comparison circuit configured to compare a first comparison signal representative of a charge on said capacitor with a second comparison signal representative of a reference charge and provide a comparison output signal in response to said comparison." For reasons similar to that earlier adduced relative to claim 1, Applicants respectfully submit claim 7 is also allowable and the Examiner's rejection of claim 7 under 35 USC §102 should be withdrawn.

Claims 8 - 13 depend directly or indirectly from claim 7 and are allowable for similar reasons above adduced relative to claim 7 in addition to their own further limitations. Claim 10, for instance, further requires "a discharge path responsive to said second switching signal to discharge said capacitor if said second switching signal is in said first state." For similar reasons above adduced relative to claim 4, Applicants respectfully submit Wilcox does not disclose, teach, or suggest "a discharge path" as further required by claim 10.

Accordingly, Applicants respectfully submit that in light of the foregoing amendments and remarks, all of the presently pending claims 1 - 13 are now in a condition for allowance. Reexamination and reconsideration are respectfully requested. Early allowance is earnestly solicited. In the event the Examiner deems personal contact desirable in disposition of this application, the Examiner is respectfully requested to call the undersigned attorney at (603) 668-6560. In the event any additional fees are payable, please charge them to our Deposit Account No. 50-2121.

Respectfully submitted,



Scott R Faber, Attorney For Applicants  
Registration No. 48,380  
GROSSMAN, TUCKER, PERREAULT  
& PFLEGER, PLLC

55 South Commercial Street  
Manchester, NH 03101  
Ph: 603-668-6560  
Fx: 603-668-2970